

Report of the
Workshop on Zooplankton Taxonomy

**Plymouth, UK
10–13 June 2003**

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International Council for the Exploration of the Sea
Conseil International pour l'Exploration de la Mer

Host Organisation

Sir Alister Hardy Foundation for Ocean Science (SAHFOS), Plymouth, UK.

Venue

Marine Life and Environmental Sciences Resource Centre, The Laboratory, Citadel Hill Plymouth, UK.

Organising group

Dr J. A. Lindley (Chair), Dr. A. J. Richardson, A.W. G John, T.D. Jonas, and J. Sidey

Participants

Lecturers

Dr G A. Boxshall (Natural History Museum, London, UK)
Dr J. A. Lindley (SAHFOS)
Dr D.V.P. Conway (Marine Biological Association, Plymouth, UK)
Dr. Nancy Copley (Woods Hole, Oceanographic Institution Woods Hole, MA, USA)
Dr Richard Kirby (MBA/SAHFOS, UK)

External

Aitor Albaina Vivanco, AZTI Foundation, Pasaia (Gipuzkoa), Spain
Astrid Cornils, Alfred Wegener Institut, Bremerhaven, Germany
Dra.M^aLuz Fernandez de Puelles, IEO, Coruña, Spain
Tania Smith, Plymouth Marine Laboratory (PML), Plymouth, UK
Claudia Castellani, PML
Lidia Yebra, PML
Delphine Bonnet, PML
Kate Willis, Scottish Association for Marine Sciences, Oban, Scotland
Slawek Kwasniewski, Institute of Oceanology (PAS), Sopot Poland
Maria Emília Cunha, Instituto de Investigação das Pescas e do Mar (IPIMAR), Lisbon, Portugal
Fátima Quintela, IPIMAR, Portugal
Steve Hay, Fisheries Research Services (FRS) Marine Laboratory, Aberdeen, Scotland
John Fraser, FRS Aberdeen
Susan Robinson, FRS, Aberdeen
Maria Pan, FRS, Aberdeen
Bjorn Ellertsen, Institute of Marine Research (IMR) Bergen, Norway
Berit Endresen, IMR, Norway
R Gowen, Department of Agriculture and Rural Development, Northern Ireland
Other SAHFOS staff
Clare Buckland, Paul Tranter, Claire Wotton, and Marianne Wootton

Absences

Maite Alvarez-Ossorio (IEO Coruña Spain) and Dr. Filipina Sotto (University of San Carlos Cebu City, Philippines) who had registered their intent to attend were unable to do so. Unfortunately the information came too late to make it possible to fill the places from a “waiting list”.

Programme

Tuesday 10 June

- 0950–1045 Copepod Morphology & General characteristics of developmental stages. Dr Geoff Boxshall (Natural History Museum)
1115–1230 Classification of Copepods (emphasis on non-calanoids). Dr Geoff Boxshall
1430–1700 Practical session
1800–1930 Ice Breaker (drinks and snacks) at the common room, Citadel Hill Laboratory

Wednesday 11 June

- 0900–1000 Taxonomy and identification of small calanoids including presentations. Dr J.A. Lindley, Dr DVP Conway (MBA)
1000–1230 Practical session
1400–1500 Silhouette analysis of zooplankton. Dr. Nancy Copley
1500–1700 Practical session

Thursday 12 June

- 0900–1000 Identification of developmental stages of Copepoda. Dr DVP Conway (MBA)
1000–1230 Practical session
1400–1430 Genetic method applied to identification of formalin preserved zooplankton. Dr. R. Kirby (MBA/SAHFOS)
1430–1545 Discussion
1615–1700 Practical session

Friday 13 June

- 0900–1000 Distinguishing Mysidacea, Euphausiacea, and pelagic stages of Decapoda and Stomatopoda. Identification of larval stages of major groups within Decapoda. Presentation Dr J.A. Lindley (SAHFOS)
1000–1230 Practical session
1400–1545 Completion of practical
1615 Final discussion. Concluding remark from Chair

Report

After introductory remarks from the Chair and a welcome from Dr Chris Reid (Director SAHFOS), the meeting started with two lucid and authoritative presentations by Geoff Boxshall. The first of these was a summary of the primitive features of Copepoda and how comparative morphological studies of modifications of these had provided the basis for copepod taxonomy. For example, fusion modifies the numbers of body segments or segments in appendages but the numbers of original segments can still be traced, for example by the setae and aesthetascs on the antennule. The second presentation was on the pelagic non-calanoid copepods. The position of these in the taxonomy of their groups was outlined, methods and references for the identification of the genera were described, including recent and ongoing taxonomic reviews of the genera. The practical session was principally dedicated to examining and discussing the identification of the non-calanoids.

The presentations on the second morning were by Alistair Lindley, who described the taxonomic changes in the Paracalanidae and the revisions of *Clausocalanus* and *Pseudocalanus* and some of the characters useful in identification in these groups. The urgent need for revision of the ICES Plankton Identification Leaflets on these groups was stressed and suggestions were invited for authors willing to undertake this. Dave Conway presented information on the identification of the Calanidae extracted from a guide, to which he had contributed, to zooplankton of the south-western Indian Ocean. The practical session that followed was mainly on the groups discussed in the presentations. Samples from the Bay of Cadiz were found to be a rich source of *Clausocalanus* spp.

After lunch an aspect of new technology applied to identification and enumeration of zooplankton was described to the workshop. Nancy Copley gave an account of the Woods Hole Silhouette Digitizer, a MATLAB-based computer program that enables the user to measure lengths and automatically calculates biomass and generates spreadsheets of derived statistics. Thanks to the IT staff of SAHFOS and PML, computers were available with software and images

loaded to enable participants to try out the system which has great potential for application to many of the types of study of interest to the ICES WGZP.

Dave Conway gave a further presentation on the developmental stages of copepods, through the egg, nauplius and copepodid stages. He described the growth, change of form and addition of limbs and body segments during development, and updated and clarified the descriptions and terminology in Conway and Minton (1975). He had examples of developmental stages picked out for the practical session, although by this time many participants were following up work started in earlier sessions.

The afternoon presentation was given by Richard Kirby who gave an account of genetic techniques, in particular as applied to formalin preserved material. Usually it is assumed that fixation by formalin damages the DNA too badly for the application of genetic methods. He described how the processes involved in fixation can be reversed and the DNA can then be extracted, amplified and sequenced. Although fresh or alcohol preserved material is still far preferable if available, the technique will make it possible to determine changes in population genetics or to identify material that can not be readily identified from the morphology from archived material preserved in formalin.

A discussion session followed, to receive feedback on the workshops and to provide recommendations for future workshops in the series. The need to update many ICES Identification Leaflet for Plankton and to fill in remaining gaps was discussed, the use of molecular methods, provision guides to local fauna and improved information exchange were discussed.

A form to provide further opportunities for feedback from the participants was distributed at the beginning of proceedings on the final day. The characteristics for distinguishing the pelagic stages of Euphausiacea, Decapoda, Mysidacea and Stomatopoda were described by Alistair Lindley. Some of the characteristics of larval stages of major sub-divisions of the Decapoda were discussed and some characteristics used in species identification were described. The remainder of the day was taken up with completing the practical work and final informal discussion.

Recommendations

1.(a) A good quality CD of the ICES Identification Leaflets should be produced as soon as possible (Work on this is in progress).

(b) Further development of electronic publication enabling interaction and updating of the leaflets, should be actively undertaken.

(c) A document template for the leaflets to standardise the format and help authors in preparation of leaflets is to be made available.

2. Further developments of molecular methods should be encouraged. A genetic database for copepoda and euphausids is being developed, information is available at www.zoogene.org.

3. Guides to the fauna of restricted geographical areas can simplify identification.

4. Future workshops should include gelatinous plankton (the current workshop concentrated on crustacean zooplankton).

Feedback

Feedback from participants was generally very positive. A significant criticism was the shortage of prepared labelled specimens. It had been intended that more material be prepared but this was not given priority and was omitted. Organisers of future workshops should give this priority for optimising the benefit of the practical sessions. Maria Emilia Cunha and Astrid Cornils have offered to prepare an Identification leaflet on *Clausocalanus*, a part replacement for Sheet 38.

Acknowledgements

We would like to thank the University of Plymouth, Olympus Optical Co. (U.K.) Ltd., Plymouth Marine Laboratory, the FRS Marine Laboratory, Aberdeen and colleagues at the MBA who made microscopes available for the workshops. Also the Marine Environmental Change Network provided support by waiving the cost of use of the Resource Centre.